

# SONG YU

✉ [songyu@caltech.edu](mailto:songyu@caltech.edu)  
🏠 <http://songyu.people.caltech.edu>

## EMPLOYMENT

Caltech-Tsinghua Joint Postdoctoral Fellow August 2023 – Present  
California Institute of Technology, Pasadena, CA, USA  
Tsinghua University Yau Mathematical Sciences Center, Beijing, China

## EDUCATION

Ph.D. in Mathematics, Columbia University, New York, NY, USA September 2017 – May 2023  
Advisor: Chiu-Chu Melissa Liu  
Thesis: *Open/closed correspondence and mirror symmetry*

B.A. in Mathematics, Pomona College, Claremont, CA, USA August 2013 – May 2017  
Academic Advisor: Shahriar Shahriari  
Thesis Advisor: Erica Flapan  
Thesis: *Symmetries of spatial graphs in homology spheres*

Certificate (with distinction), Math in Moscow, Moscow, Russia September – December 2015  
Certificate, Budapest Semesters in Mathematics, Budapest, Hungary June – August 2015

## HONORS AND AWARDS

1. Dean's Fellowship, Columbia University September 2017 – May 2023
2. Hugh J. Hamilton Prize in Mathematics, Pomona College May 2017
3. Summer Undergraduate Research Program funding, Pomona College June – August 2016
4. Bruce Jay Levy Prize in Mathematics, Pomona College May 2016
5. AMS scholarship for Math in Moscow Program September – December 2015
6. Llewellyn Bixby Mathematics Prize, Pomona College May 2015
7. Summer Undergraduate Research Program funding, Pomona College May – July 2014
8. Jaeger Mathematics Prize, Pomona College May 2014

## RESEARCH PAPERS

### In Preparation

1. *Hodge-theoretic open/closed correspondence and extended Picard-Fuchs system.*
2. *Topological recursion, Crepant Transformation Conjecture, and holomorphic anomaly equations*, with Bohan Fang, Chiu-Chu Melissa Liu, and Zhengyu Zong.

## Preprint

1. *Open WDVV equations and Frobenius structures for toric Calabi-Yau 3-folds*, with Zhengyu Zong, [arXiv:2312.06160](#).
2. *Open/closed BPS correspondence and integrality*, [arXiv:2307.13542](#).
3. *Orbifold open/closed correspondence and mirror symmetry*, with Chiu-Chu Melissa Liu, [arXiv:2210.11721](#).
4. *The Open Crepant Transformation Conjecture for toric Calabi-Yau 3-orbifolds*, [arXiv:2002.08524](#), to appear in J. Differential Geom.

## Published

1. *Open/closed correspondence via relative/local correspondence*, with Chiu-Chu Melissa Liu, Adv. Math. **410** (2022), Paper No. 108696, 43 pp.
2. *Symmetries of spatial graphs in 3-manifolds*, with Erica Flapan, Fundam. Math. **255** (2021), 289–308.
3. *Avoiding brooms, forks, and butterflies in the linear lattices*, with Shahriar Shahriari, Order **37** (2020), 223–242.

## RESEARCH PRESENTATIONS

1. *Integrality structures in open and closed Gromov-Witten theory*, Workshop on Enumerative Geometry, University of Oregon, Eugene, OR, USA, April 13, 2024.
2. *Open/closed correspondence and mirror symmetry*, Mathematics - String Theory Seminar, Kavli Institute for the Physics and Mathematics of the Universe, Kashiwa, Japan, March 28, 2024.
3. *Open WDVV equations and Frobenius structures for toric Calabi-Yau 3-folds*, Hebrew University Topology and Geometry Seminar, virtual, February 20, 2024.
4. *Knot invariants, Gromov-Witten invariants, and integrality conjectures*, Claremont Topology Seminar, Claremont, CA, USA, January 30, 2024.
5. *Open/closed correspondence and mirror symmetry*, Caltech/USC Joint Algebra and Geometry Seminar, Caltech, Pasadena, CA, USA, October 5, 2023.
6. *Open/closed correspondence and mirror symmetry*, Western Hemisphere Virtual Symplectic Seminar, virtual, February 17, 2023. [Recording] [Slides]
7. *Open/closed correspondence and mirror symmetry*, Geometry and Physics Seminar, Boston University, Boston, MA, USA, December 7, 2022.
8. *Open Crepant Transformation Conjecture for toric Calabi-Yau 3-orbifolds*, Algebra Seminar, University of Oregon, Eugene, OR, USA, October 11, 2022.
9. *Orbifold open/closed correspondence*, Integrability, Enumerative Geometry and Quantization, Simons Center for Geometry and Physics, Stony Brook, NY, September 20, 2022. [Recording]
10. *Open/closed correspondence via relative/local correspondence*, MAP Meeting, Boston College, virtual, February 26, 2022. [Recording]

11. *Open/closed correspondence via relative/local correspondence*, Online Geometry and Physics Seminar, Institute for Advanced Study in Mathematics, Zhejiang University, virtual, January 4, 2022. [Recording]
12. *The Open Crepant Transformation Conjecture for toric Calabi-Yau 3-orbifolds*, Informal Mathematical Physics Seminar, Columbia University, virtual, May 11, 2020. [Recording]
13. *Symmetries of graphs in homology spheres*, AMS Session for Contributed Papers on Undergraduate Research, 2017 Joint Math Meetings, Atlanta, GA, USA, January 5, 2017.
14. *Symmetries of graphs in homology spheres*, International Workshop on Spatial Graphs (IWSG 2016), Waseda University, Tokyo, Japan, August 5, 2016.
15. *Forbidden configurations in the linear lattices*, Claremont Colleges Algebra, Number Theory, and Combinatorics Seminar, Claremont, CA, USA, March 1, 2016.
16. *Forbidden configurations in the linear lattices*, Budapest Semesters in Mathematics Colloquium, Budapest, Hungary, July 22, 2015.

## TEACHING EXPERIENCE

### Instructor, Caltech

- |                         |           |
|-------------------------|-----------|
| 1. Algebraic geometry A | Fall 2023 |
|-------------------------|-----------|

### Instructor, Columbia University

- |  |             |
|--|-------------|
| 1. Linear algebra                                      | Summer 2021 |
| 2. Calculus II   | Summer 2020 |
| 3. Topics in graph theory (undergraduate seminar)      | Fall 2019   |
| 4. Elementary applied topology (undergraduate seminar) | Spring 2019 |

### Teaching Assistant, Columbia University

- |                                       |                                     |
|---------------------------------------|-------------------------------------|
| 1. Introduction to algebraic topology | Spring 2023                         |
| 2. Topology                           | Fall 2022                           |
| 3. Linear algebra                     | Spring 2022                         |
| 4. Calculus II                        | Fall 2021, Spring 2021, Summer 2019 |
| 5. Modern algebra                     | Fall 2020                           |
| 6. Calculus III                       | Spring 2020                         |
| 7. Calculus I                         | Fall 2018                           |

## SEMINARS CO-ORGANIZED

### Caltech

- |   |                 |
|---|-----------------|
| 1. Southern California Algebraic Geometry Seminar | April 6, 2024   |
| 2. Learning seminar on quasimap theory            | Winter 2024     |
| 3. Caltech/USC Joint Algebra and Geometry Seminar | Since Fall 2023 |

4. Caltech-Tsinghua Joint Colloquium

Since Fall 2023

**Columbia University**

1. Learning seminar on intersection theory

Fall 2018